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Report on the 70 m.p.h. Speed Limit Trial

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INTRODUCTION

A general speed limit of 70 m.p.h. came into operation at noon on December 22, 1965 on all roads in Great Britain (including motorways) not already subject to a lower limit. The Road Research Laboratory was asked by the Minister of Transport to assess the effect of the limit, and an interim Report was published in July 1966[1]. In that Report it was concluded that the indications up to that time were that conditions during the trial, both on motorways and on ordinary roads, were safer than before. However, further work covering a longer period was considered necessary to substantiate the validity of these indications.

Various aspects of the speed limit have now been studied in greater detail, using information covering at least 12 months' experience of the limit and the results are described in this Report.

SCOPE OF THE REPORT

The main reason for the 70 m.p.h. speed limit trial was to discover what effects, if any, such a limit had on the numbers and severity of road accidents. To assess this the Laboratory studied the numbers of accidents and casualties which occurred on different types of road before and after the limit came into operation, relating them to the amount and kind of traffic on the roads taking into account, as far as possible, variations in other road conditions (e.g. the weather) which might affect their number. Traffic flows and vehicle speeds were measured before and after the introduction of the limit and several sample surveys were made to obtain information about drivers' and non-drivers' attitudes towards the limit and about their knowledge of its application.

SPEED STUDIES

Method

Speeds were measured at five places on straight level sections of road. The locations were as follows:

Motorways. M.1 (dual three-lane). Two miles north of Newport Pagnell Service Area. (Southbound.)

M.4 (dual three-lane). One mile east of Langley (Slough East) Interchange. (Westbound.)

M.4 (dual two-lane). West of Slough Central Interchange. (Eastbound.)

All-purpose roads. A.1 (dual two-lane). Near Huntingdon. (Northbound.)

A.412 (three-lane). Between Denham and Rickmansworth. (Northbound.)

At the site on M.1 speeds were measured by two radar speedmeters, one on the shoulder measuring the speeds of vehicles in the nearside lane, and one on the central reserve for vehicles using the centre and outer (third) lanes. The

observers attempted to measure the speeds of all vehicles, and in practice only about 5 in 1000 were missed. At the two sites on all-purpose roads, a single radar speedmeter was used, operating from the nearside verge. Here also the observers attempted to measure the speeds of all vehicles and in practice about 5% were missed, mainly due to overtaking vehicles being masked by vehicles nearer the instrument. The results were adjusted for possible underestimation by assuming that the speeds of the missed vehicles had the same distribution as the measured speeds of vehicles in the same lane.

At the two sites on M.4, speeds were measured by means of a pair of pneumatic vehicle detectors connected to an electronic timing device. A 50% sample was taken by measuring the speed of every second vehicle passing the site.

As is usual in such measurements made by the Laboratory, everything possible was done to make the presence of the speedmeters and the observers as inconspicuous as possible. In using the radar speedmeter the observers' car was parked on the shoulder or verge to give the impression of being broken-down. The part of the apparatus outside the car was only about the size of a vehicle headlamp and it was mounted close to the back of the car. On M.1, where a second unit was used, it was mounted next to the vehicle guard rail on the central reserve and the cable connecting it to the car was concealed behind an overbridge. When using the detector type of speedmeter the vehicle containing the equipment was parked on an overbridge and well to the side of the road. It is believed that only a negligible proportion of drivers could have been aware that they were being observed; in any event the speeds were measured before the drivers would have had time to slow down. Independent observations from a test vehicle moving along the road confirmed the estimated proportion of vehicles exceeding 70 m.p.h. given by the speedmeter measurements.

To ensure comparability between measurements made before and those made after the introduction of the speed limit the work was confined to fine, clear weather on weekdays. The shortage of good weather during the winter months, in which much of the study was made, caused considerable practical difficulties and limited the scope of the measurements.

The "before" measurements were started as soon as practicable after the Minister's announcement about the introduction of a 70 m.p.h. speed limit, and were completed by the middle of December 1965, the work at each site being spread over two or more weekdays. At each of the five sites, six hours' observations were taken during the hours of daylight (between 10 a.m. and 4 p.m.) and at each of two sites an additional four hours' observations were taken during the hours of darkness (between 7 p.m. and 11 p.m.). The "after" measurements were mainly made on five occasions as follows: January/February 1966; May/June 1966; September 1966; December 1966/January 1967; March/April 1967. These followed the same pattern as the "before" measurements and they were made, as far as possible, at the same times of day on the same days of the week.

The total duration of all the speed measurements was over 180 hours and, in all, the speeds of about 86 000 vehicles were measured.

Although the main results of all the sets of measurements are given below, the more detailed analyses for motorways are confined to a comparison between the "before" study in mid December 1965 and the study about a year later in

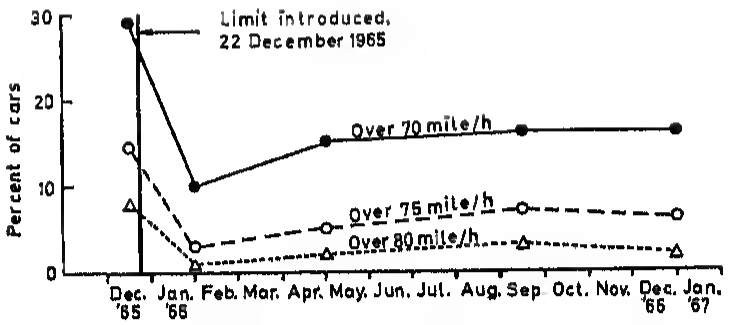

Fig. 1. Trends in the speeds of cars averaged over three sites on motorways

December 1966 and January 1967. This has been done partly to eliminate the effect of any seasonal trend in speeds and partly to avoid focussing undue attention on the immediate effect of the introduction of the speed limit, which would not be expected to be applicable in the long term. In the case of all-purpose roads, full results were not available for December 1966/January 1967 and the more detailed analyses refer to September 1966, compared with the "before" study in December 1965.

RESULTS OF SPEED STUDIES

The main features of the trends in the speeds of cars on motorways are given in Table 1 and Fig. 1 which refer to the combined results for the site on M.1 and the two sites on M.4. These results present a very clear picture; the introduction of the speed limit was followed by a striking reduction in speeds, with a subsequent upward tendency but speeds eventually became more or less stable at a level appreciably lower than before the introduction of the speed limit. In particular, the proportion of cars exceeding 70 m.p.h. dropped from about 30% just before the speed limit was introduced in December, to about 10% shortly afterwards, rising again to about 15%, and this level was maintained during the second half of 1966 and into 1967. Similarly the proportion exceeding 80 m.p.h. dropped from 8% to 1%, subsequently rising to about 2%. The mean speed displayed a similar kind of tendency. Table 1 also lists the standard deviation of speeds which is a statistical measure of variability of the observations; the lower values since the introduction of the speed limit indicate that the range of speeds has been narrowed.

Table 2, which compares the "before" measurements at individual motorway sites with those taken about a year later, shows that the three sites gave substantially similar results. In all cases the percentage of cars exceeding 70 m.p.h. in the winter of 1966/67 was about one-half the previous figure, the percentage exceeding 80 m.p.h. was reduced by about three-quarters and the standard deviation by about one-fifth. Table 2 also shows that the observations taken during the hours of darkness on M.4 gave very similar results to those taken in daylight.

Tables 1 and 2 give the percentages of cars exceeding 70 and 80 m.p.h., but for some purposes more detailed information about the distribution of vehicle speeds may be required. This is given in Table 3 which refers to the combined distribution for the three motorway sites, just before and one year after the introduction of the speed limit. It shows that, when the speed limit was in force, the percentages of speeds in the 5 m.p.h. speed groups above 70 m.p.h. were all lower than before, with a corresponding increase in the speed groups below 70 m.p.h. It has been suggested that the introduction of the speed limit might cause the slower vehicles to "drive up to the limit". If this were so, it would be expected that the proportion of vehicles in the lower speed groups below, say, 60 m.p.h. would have been reduced, but Table 3 shows that no such reduction has occurred. It would appear, therefore, that the increase in the proportion of vehicles travelling between 60 and 70 m.p.h. is attributable to vehicles which previously exceeded 70 m.p.h. and that there is no evidence of any upward movement in the speeds of the slower vehicles. An alternative method of representing the distribution of speeds is by cumulative frequency diagrams and these are

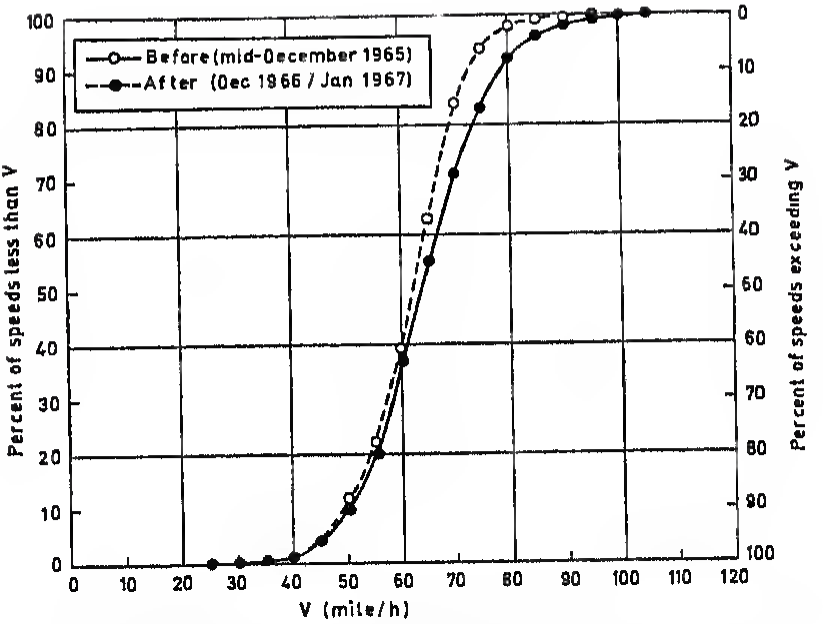

Fig. 2. Cumulative frequency distributions of car speeds (averaged over three sites, on motorways) just before and one year after introduction of speed limit

shown in Fig. 2. The shift of the curve to the left indicates that tbere has been a general slowing down in the traffic; the speed reductions ranged from about 10 m.p.h. for cars which previously travelled at 90 m.p.h. down to about 1 m.p.h. for cars which previously travelled at 60 m.p.h.

Conditions in tbe offside lane on 3-lane motorways are of particular interest and the results for M.1 are given in Table 4. Tbe main conclusion from Table 4 is tbat the existence of the speed limit caused a reduction in mean speed in the offside lane from 73 to 68 m.p.h. and a reduction in the proportion exceeding 70 m.p.h. from 61 to 37%. Tbe proportion exceeding 90 m.p.h. was reduced from 4½% in the "before" study to 1% in the "after" study. Another result is given in Table 5 which shows that, before the introduction of the speed limit, about one-third of all cars travelled in the offside (third) lane. Afterwards, the proportion was only one quarter.

The information in Tables 1–4 and Figs. 1 and 2 relates only to the speeds of cars, but similar analyses for goods vehicles showed that, before the introduction of the speed limit, very few goods vehicles exceeded 60 m.p.h. and practically none exceeded 70 m.p.b. The introduction of the speed limit was accompanied by some reduction in the speeds of goods vehicles but the changes were very much smaller and less regular than those for cars. Tbe speeds of goods vehicles also showed a slight tendency to rise subsequently so that, by the end of the first year of operation of tbe speed limit, speeds were almost indistinguishable from those before its introduction. An example of such results is given in Table 6, which refers to M.1.

In interpreting the results of the speed measurements in this Report, it must be noted that speeds of cars and goods vehicles on motorways (and main all-purpose rural roads) have been increasing over the years by an average of about 1 m.p.h. per year. For example, average rates of increase on M.1 between 1959 and 1965 were observed to be[2]:

Cars	0·70 m.p.h. per year
Light goods vehicles	0·71 m.p.h. per year
Medium goods vehicles	0·98 m.p.h. per year
Heavy goods vehicles	1·24 m.p.h. per year

This may partly explain the tendency for speeds to rise during the year after the speed limit was introduced. It also means that the effective reductions in speed attributable to the speed limit are even greater than those based on the comparisons above, between measurements just before the limit was introduced and tbose one year later.

Information about speeds at the two sites on all-purpose roads is given in Tables 7 and 8. As would be expected, speeds on these roads are substantially lower than on motorways. For example, Table 8 shows that the proportion of cars exceeding 70 m.p.h. in the "before" study was 14% at the site on A.1 (dual two-lane) in dayligbt and 3% on A.412 (single three-lane); these compare with 30% on motorways (see Table 2). In addition, Tables 7 and 8 show a tendency for speeds on all-purpose roads, particularly on the dual-carriageway roads, to be lower after the introduction of the speed limit than before, but the effect was less marked and less consistent than on motorways.

Although measurements at only two sites cannot be expected to give an adequate assessment of the effect of the speed limit on speeds on all-purpose roads, some useful conclusions can be drawn. The dual-carriageway section of road A.1 which was studied is much faster than the average rural road but not as fast as motorways. Tables 7 and 8 provide evidence of an appreciable reduction in speed on this road, although the effect is less marked than on motorways. At the site on the three-lane single carriageway road A.412, the mean speed of cars was about 50 m.p.h., i.e. 10 m.p.h. lower than on A.1, and the effect of the speed limit on speeds was correspondingly smaller and less definite. The majority of rural roads are narrower than A.412 and speeds are probably appreciably lower. In 1960 the mean speed of cars averaged over 34 representative sites on Trunk and classified roads in rural areas was only 33 m.p.h., with 4% of cars exceeding 50 m.p.h.[3]. Although speeds have probably increased since then, it is unlikely that the overall mean speed of cars had reached 40 m.p.h. by the time the speed limit was introduced in 1965, and the proportion exceeding 70 m.p.h. was undoubtedly very small, possibly of the order of 1% or less. It may be concluded that speeds on only a small minority of all-purpose rural roads could have been appreciably affected by the introduction of the speed limit and that the effect on rural roads as a whole was probably negligibly small.

It should be noted that at present the total mileage travelled on dual-carriageway roads is only 6% of the total mileage travelled on all rural roads.

Bunching

Various definitions of the term "bunching" appear to be in use but in this Report it is taken to mean several vehicles following unnecessarily closely behind one another in the offside lane of a motorway.

Such bunching occurred before the speed limit was introduced, particularly on the busier motorways. As the flow of traffic increases the average distance between successive vehicles must decrease, so that the proportion of vehicles following each other closely must be expected to increase. Table 5 indicates that the introduction of the 70 m.p.h. speed limit caused a reduction of about one-quarter in the proportion of all cars which travelled in the offside (third) lane. This reduction would, in itself, be expected to reduce the tendency to bunch in that lane but, on the other hand, the reduction in the spread of speeds after the introduction of the speed limit (see Table 4) might be conducive to the formation of bunches. It is now extremely difficult, if not impossible, to check whether bunching has in fact increased, because there is practically no information about the separation between vehicles before the introduction of the limit. The only information available refers to less than one hour's observations of traffic in the offside lane of the three-lane portion of the M.4 in December 1965, and comparison with similar measurements after the introduction of the speed limit suggested that the tendency for vehicles to travel close together had increased. However, results based on such a small amount of data are unlikely to be representative and the comparison must be regarded as inconclusive.

In the Highway Code drivers on motorways are urged to "allow ample distance between your vehicle and the one ahead according to speed"; the rule "at least one vehicle length for every 10 m.p.h. of your speed" is sometimes recommended, for example by the Royal Society for the Prevention of Accidents. (If

the average length of a vehicle is taken to be 15 ft, this rule is equivalent to a time difference of one second, at any speed, between the passage of the rear of one vehicle and the front of the following vehicle.) Observations of vehicles travelling in the offside lane of the Slough By-pass (dual two-lane) in March 1967 showed that during the morning peak hour, when the traffic flow in this lane was 2800 vehicles per hour, about 55% of following distances were less than that given by the above rule. Since the average speed of these vehicles was 45 m.p.h., with no vehicles travelling as fast as 70 m.p.h., it is evident that this bunching was purely a consequence of the high traffic flow and it cannot be attributed to the 70 m.p.h. limit. In off-peak measurements at the same site, when the traffic flow in the offside lane was about 550 vehicles per hour, the proportion of following distances less than that given by the above rule was much less, about 17%.

It may be concluded that many drivers on motorways drive undesirably close to the vehicle in front but that much of this close following is a consequence of the high traffic flows. The role played by the existence of the 70 m.p.h. speed limit is difficult to determine but it may be quite small. The real test of whether the speed limit has caused an appreciable increase in dangerous bunching is whether accidents have increased. This is considered later in this Report.

Another concept of bunching which has been used is that of groups of vehicles travelling abreast in different lanes at about the same speed. This matter has not been studied but it might be expected that the speed limit has increased the frequency of such occurrences.

CASUALTIES AND ACCIDENTS ON MOTORWAYS

Casualties on all motorways

Fewer people were killed in all motorway accidents (including accidents in fog) during the trial year than in either of the two previous years (see Table 9), and the total number of motorway casualties was lower in 1966 than in the previous year.

This section deals with the problem of deciding whether any part of this improvement on motorways could be reasonably attributed to the 70 m.p.h. speed limit and will begin by considering how to derive an estimate of the number of casualties that would have been expected to occur (in the statistical sense) without the speed limit.

For several reasons a precise estimate cannot be made. The lack of motorway traffic data in sufficient detail, and the fact that the mileage of motorways in use has been growing during the period studied, prevent a precise allowance being made for all the effects which differences in weather and other road conditions between 1966 and the two previous years might have had. Even if these details were available and such a calculation were attempted the numbers of motorway casualties are small (from a statistical point of view) so that a wide range of uncertainty would attach to many of the results, especially if the data were subdivided into still smaller numbers. For instance, considering the fatalities in Table 9, the odds are 19 to 1 that the number each year would fluctuate by chance within 20% of the tabulated values even if no change in road conditions occurred. However, by dealing with total casualties (which, because of their larger numbers, would be subject to relatively smaller chance fluctuations), it is possible to draw some conclusions.

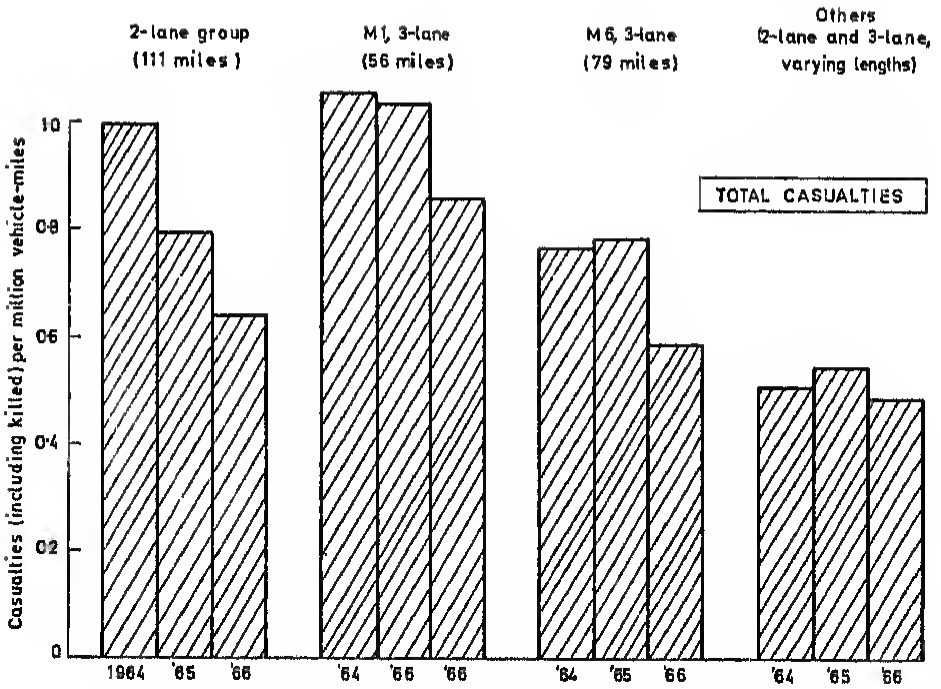

Fig. 3. Casualty rates per million vehicle-miles on motorways (accidents in fog included)

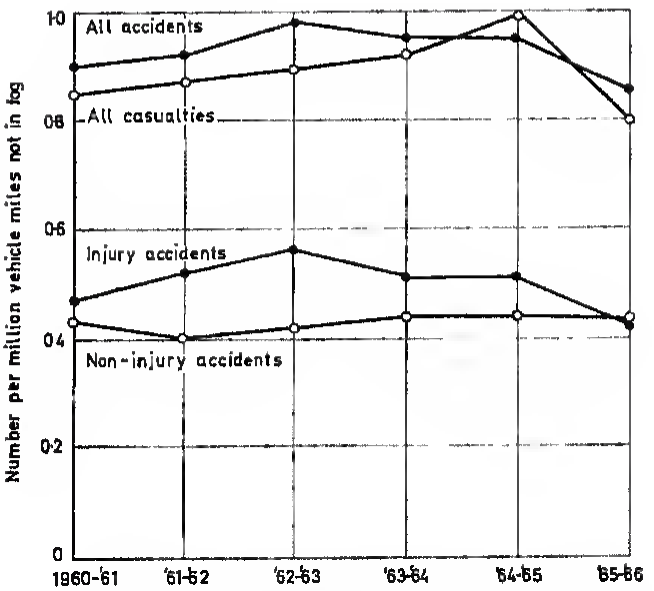

Fig. 4. Accident and casualty rates on 73 miles of M.1/M.10/M.45—12 month periods

The mileage of motorway in use has changed from year to year, but it is possible to allow for this change to some extent. This was done by separating them into four groups, consisting of 111 miles of 2-lane motorway, 56 miles of M.1 (3-lane), 79 miles of M.6 (3-lane), and the remainder. The latter group, consisting largely of 2- and 3-lane motorways which came into use in 1964, or later, increased in length from 44 miles in 1964 to 198 miles at the end of 1966. The first three groups remained unchanged in length throughout the three years. Although this classification has the advantage that three of the groups are of constant length and comprised 85% of all motorways in 1964, it also has the disadvantage of increasing the chance fluctuations, because the casualty sample for each group is necessarily smaller than the total for all motorways. The data for the groups are given in Table 10. Casualty rates per million vehicle-miles for each group, derived from Table 10, are shown in Fig. 3 and these will now be examined in turn with a view to estimating the expected rates in 1966 had the speed limit not been in operation.

Considering first the sections of M.1 and M.6, in both cases the rates changed very little between 1964 and 1965; on M.1 there was a small reduction and on M.6 there was a slight increase. Evidence will be given later (see Fig. 4) to show that over a longer period (the five years 1961–1965) the casualty rate not in fog on 73 miles of M.1/M.10/M.45, including the 56-mile 3-lane length, was almost constant, though there was a tendency to rise.

In view of this and the small differences between total rates for 1964 and 1965 on both M.1 and M.6, it will therefore be assumed that the best estimate of the expected casualty rate for 1966 in these two cases is the average of the rates for 1964 and 1965. This estimate is likely to be conservative since fog accidents are included and these were at a high level in 1964.

For the group consisting mainly of the newer motorways the difference (an increase) between the rates for 1964 and 1965 was slightly greater than the difference on either M.1 or M.6. It was not, however, statistically significant and cannot be regarded as indicative of a real trend. Thus the best estimate of the expected casualty rate for this group in 1966 will, as in the case of M.1 and M.6, be taken as the average of the rates for 1964 and 1965.

On the 2-lane group of motorways there was a reduction of 20% in the casualty rate between 1964 and 1965, a variation greater than one would normally expect.

However, as has been pointed out above and is shown in Tables 11 and 15, 1964 was a bad year for fog accidents. In that year 15% of all casualties occurred in fog on M.1 and M.4 combined (the only motorways for which the Laboratory receives a special accident report from the police stating whether the accident occurred in fog) compared with 3% in 1965. This probably reduces the difference between 1964 and 1965 casualty rates on this group of two-lane motorways to that which may have occurred by chance, so again we will take the average rate between 1964 and 1965 for comparison.

Thus on the basis of the evidence available the best estimate of the expected casualty rate in 1966 for each group of motorways is the average for 1964 and 1965.

On this basis, using the data in Table 10A, the expected numbers of casualties in 1966 for each group of motorways were then calculated and are given in part (i) of Table 10B.

Reference to Table 9 shows that in both 1964 and 1965 fatalities constituted 6% of all motorway casualties, while serious injuries were 31% of the total in 1964 and 29% of the total in 1965. Taking the average value of 30% for seriously injured, and noting that there was no trend in the percentages killed or seriously injured between the two years, the expected casualties in part (i) of Table 10B can be separated to give expected numbers of each severity for comparison with those that actually occurred, as in part (ii) of Table 10B. This shows that there were about 480 fewer casualties on motorways in 1966 compared with the best estimate of the expected numbers that can be made on the evidence available, a reduction of 20% and that the saving included an estimated 60 fatalities.

It remains to consider what factor or factors, operating only in 1966 on all motorways, could have contributed to a saving in casualties of this order.

The overall casualty rate per million vehicle-miles has been falling in recent years throughout the country and a reduction on motorways might therefore have been expected. Although there may be other beneficial factors operative, this improvement in the national casualty rate is mainly as a result of a decline in the amount of two-wheeled traffic and the casualty rate to drivers and occupants of other vehicles has been increasing slowly. Since pedal cycles are not allowed on motorways and motorcycles form less than 3% of motorway traffic (and their riders and passengers formed about 9% of all motorway casualties in 1965 and 8% in 1966), the decline in their numbers is not likely to be of any importance in the present calculation. Furthermore, the drop in two-wheeled traffic has been in progress for several years and did not occur in 1966 only.

Another possible factor in reducing the casualty rate might be a decrease in the prevalence of fog. This has already been discussed but later in this report it is shown that the improvement occurred on M.1 and M.4 when this had been taken into account and that casualties in fog accidents only occasionally form more than 10% of the annual total on these motorways. Even if there had been no fog accidents at all in 1966 (and this was not the case) an improvement of the order calculated above could not have occurred. The proportions of accidents in fog were very similar in 1965 and in 1966.

The prohibition of heavy goods vehicles from using the third (offside) lane might have contributed but the effect of this was known to be small and, as will later be shown, changes in the casualty rate after the prohibition came into operation were about the same on 3-lane motorways as on the unaffected 2-lane motorways.

There were not likely to have been sudden increases during 1966 in the use of safety belts, improved tyres, or other safety devices on vehicles; neither was there any reason to suppose that drivers' behaviour suddenly altered other than the change in speeds associated with the speed limit.

The only major change in motorway conditions known to have occurred in 1966 was the 70 m.p.h. speed limit trial together with the extra police supervision

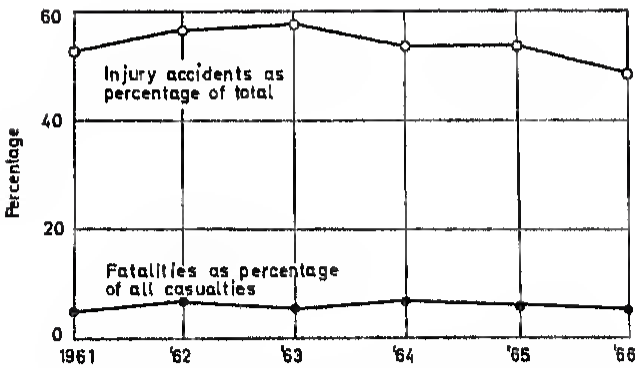

Fig. 5. Accidents and casualties not in fog on 73 miles of M.1/M.10/M.45—12 month periods beginning noon December 22nd

accompanying it (including the advisory 30 m.p.h. speed limit while the warning lights are in use). It must therefore be concluded that the speed limit trial was mainly responsible for the decrease in the motorway casualty rate.

There have been difficulties in making the above comparison because of the growing length of motorways (for some lengths of which no direct comparisons with and without limit were possible) and also lack of complete information on some motorways of the accident circumstances, such as fog conditions. It was felt therefore that a more detailed analysis of the effect could be obtained by considering the changes in some lengths of motorway for which fuller information covering a longer time is available. This is discussed in the following paragraphs.

Accidents on M.1

The above analyses refer to motorway accidents and traffic at all times of the year obtained from the national accident statistics. They therefore include any possible effects of the motorway warning light system, and the advisory 30 m.p.h. speed limit, which came into operation on all motorways when the 70 m.p.h. speed limit was introduced. The lights are switched on by the police to give advance warning to drivers of fog, accidents and other adverse conditions. The effect of the lights as far as fog is concerned can be separated from the 70 m.p.h. speed limit's effect on accidents by omitting accidents which are reported by the police to have occurred in fog, together with the estimated amount of traffic during fog. It was possible to make such an allowance in the cases of M.1 and M.4, for which the police provide the Laboratory with more detailed information. There were, however, not enough accidents, and the period for which the data were available was too short, to allow reliable estimates of the effect of other weather conditions on the overall motorway accident rate to be calculated. For instance, accidents in wet or icy conditions formed about 37% and 5% respectively of all accidents on M.1 in 1965 (the year before the trial) but no traffic observations are available on which to base an estimate of the corresponding vehicle-mileages travelled in each of these conditions. However, the variations in these percentages from year to year are small.

The accident data for M.1 are given separately in Table 11 and the rates per million vehicle-miles derived from them are shown in Table 12. The four rates are also shown graphically in Fig. 4.

During the trial year the total accident rate and the injury accident rate not in fog were the lowest recorded on this motorway since it was opened, and both were significantly less than the average for the preceding five years (by 10% and 16% respectively). The casualty rate, which had been increasing from year to year, also fell to a level below the lowest previously recorded on this motorway and was about 15% lower than the average for the previous three years. There was no change in the non-injury accident rate, which had remained almost constant since 1960.

Fig. 5, giving some of the data from Table 11 in graph form, shows that during the trial year injury accidents formed the lowest recorded proportion of total accidents; this reduction in the average severity of accidents on M.1/M.10/M.45 is statistically significant at the 10% level.

There was also some reduction in fatalities expressed as a proportion of all casualties on this length of motorway but this was not statistically significant.

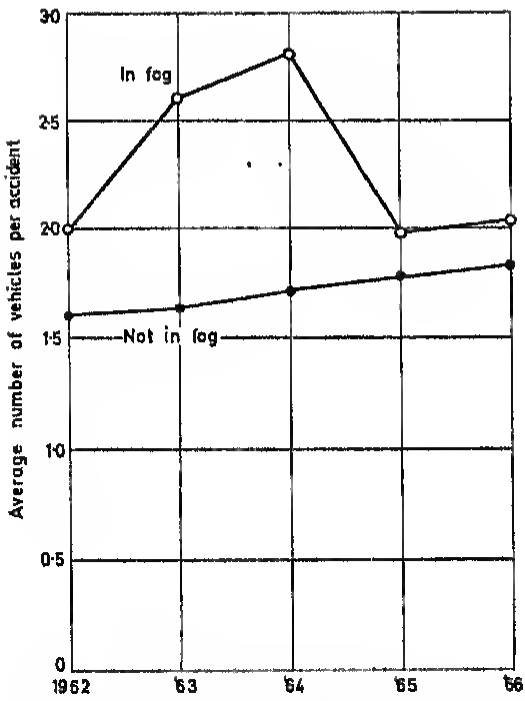

Fig. 6. Average number of vehicles per accident on M.1/M.10/M.45—12 month periods beginning noon December 22nd

As already mentioned in the section on speed studies, fears had been expressed that a restriction on vehicle speeds would cause them to "bunch" and thereby increase the risk of multiple-vehicle accidents. An analysis was therefore made to discover any evidence of this.

Table 13 shows the numbers of accidents in which various numbers of vehicles were involved in all accidents on M.1/M.10/M.45 in five successive years. The average number of vehicles involved per accident (excluding those reported to have occurred in fog) has tended to increase over the years in keeping with traffic growth, and during the speed limit trial this proportion continued to rise at the same rate as before (see Fig. 6). Similarly, the proportion of multiple-vehicle accidents (e.g. those involving three or more vehicles) also continued to rise slowly as in the previous years. In other words, there was no evidence to suggest that the speed limit had caused a sudden increase in the numbers of multiple-vehicle accidents.

Accidents involving large numbers of vehicles tend to be spectacular and attract much attention but, as Table 13 shows, they have always formed a small proportion of the total number and although this proportion has been increasing over the years it did not increase exceptionally during the trial year.

Accidents in fog tend to involve more vehicles per accident than those in clear weather but the average number involved is subject to large chance fluctuations because of the small numbers of fog accidents.

For the same reasons an analysis was made of the number of accidents in which one of the vehicles involved ran into the rear of another. Table 14 shows that during the trial year the number of such accidents on M.1/M.10/M.45 (excluding those in fog) was about the same as in the preceding two years and that the relative rate at which they occurred (allowing for the increase in vehicle-mileage) was in fact lower than it had been for four years. This result is consistent with that of the preceding analysis.

Accidents on Slough and Maidenhead By-passes (M.4)

Table 15 gives similar accident and casualty data to those in Table 11 for the Slough and Maidenhead By-passes (M.4), consisting of 11½ miles of 2-lane motorway, and Table 16 shows the corresponding rates per million vehicle-miles. During the trial year the rates were all lower than in either of the two preceding years. Compared with the average rates for the two previous years the 30% reduction in the total accident rate, the 25% reduction in injury rate, and the 35% reduction in non-injury rate were all significant at the 5% level.

The number of fatalities alone was too small to enable reliable conclusions to be drawn.

Tyre failures in motorway accidents

If high speeds are maintained for long periods the risk of tyre failure is increased because extra heat is developed in the tyre walls, particularly when tyre pressures are low.

The reduction in speeds brought about by the speed limit might therefore result in less risk of tyre failure. Analysis of the accident records for M.1 showed

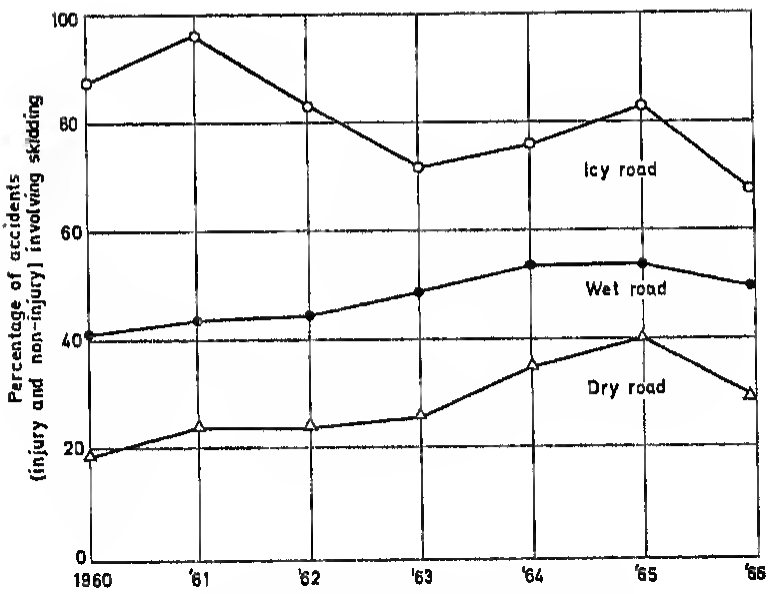

Fig. 7. Skidding on M.1/M.10/M.45

that the number of accidents resulting from tyre failure (per million vehicle-miles) had been falling over the years and that this trend, shown in Table 17, was continued during the speed limit trial, when the rate was equal to the lowest recorded.

An improvement in this respect had been noted in the Interim Report dealing with the first three months of the speed limit trial. The increased use of improved tyres might have contributed to the general fall over the years. There was however no evidence from the fuller analysis covering a whole year's experience that the speed limit had any effect on the trend.

Skidding in motorway accidents

As the resistance of the road surface to skidding is generally greater at low speeds than at high speeds, skidding would be expected to occur less often as a consequence of the speed reductions brought about by the speed limit. To examine this an analysis was made of the accident records for M.1 and the results are shown in Table 18 and Fig. 7. They indicate that the proportion of accidents involving skidding was smaller during the trial year than in the previous two years. For accidents on wet roads and on dry roads the proportions involving skidding had been increasing over the past five years but during the trial year this rising tendency was reversed, indicating that the reduction in speeds might have reduced the risk of skidding. The reduction on dry roads (from 37% to 29%) was statistically significant.

The proportion of accidents involving skidding on icy roads was the lowest recorded but is subject to fairly large chance fluctuations because of the small numbers of such accidents. It might also have been affected by the use of the warning light system.

Prohibition of heavy goods vehicles from the offside (third) lane

From May 23, 1966, heavy goods vehicles and vehicles drawing trailers were prohibited from using the offside (third) lane of 3-lane motorways. A preliminary analysis of the data for M.1 had already indicated that, as far as accidents are concerned, the effect would be small. In 1964, as far as the accident stories could be interpreted, there were only 10 accidents (injury and non-injury) in which a goods vehicle in the offside (third) lane contributed to an accident involving a car. This amounted to about 2% of all accidents on the 3-lane main carriageway. In 1966, when the speed limit was in operation for the whole year and the ban also operated for the last seven months, there were six such accidents. With such small numbers it was obviously not possible to draw reliable conclusions on the changes that resulted from the introduction of the prohibition. Instead, a comparison was made of the total accident rate on the two lengths of 3-lane motorway with that on the group of 2-lane motorways, to which the restriction did not apply and which could therefore be used as a control. Table 19 shows that changes in the injury accident rate and in the casualty rate on the 3-lane motorways after the prohibition came into effect were almost the same as those on the 2-lane group. It is concluded that although the ban may have advantages other than in accident prevention it can be ignored in assessing the effect of the 70 m.p.h. speed limit.

Later motorway accident data

After the main analysis had been carried out further traffic and accident data became available in respect of the 73-mile section of M.1/M.10/M.45 up to March 31, 1967. From these the accident and casualty rates not in fog were calculated and are shown in Table 20. They are based on fewer accidents than those given in the main analysis and are therefore subject to greater chance fluctuations. However, they indicate that the accident rates in the two periods subject to the 70 m.p.h. limit were lower than in any previous similar period and therefore support the findings in the main investigation.

INJURY ACCIDENTS ON ALL-PURPOSE ROADS

Method of analysis

In order to assess the effect of the 70 m.p.h. speed limit it is necessary to compare the number of accidents which actually occurred while it was in operation with the number that would have been expected if it had not been introduced. To predict the expected number the effect of various factors, such as changes in the weather and traffic composition, must be taken into account. As already mentioned, in the case of motorways the numbers of accidents were too small, and the period covered by the data too short, for complete estimates of the effects of these variables to be made. It is likely also that weather conditions affect the amount and kind of traffic on ordinary roads to a greater extent than on motorways. On ordinary roads, for example, the weather can increase or reduce the numbers of pedestrians and the number of pedal cycles and motorcycles in the traffic, thereby affecting the accident rate. Preliminary attempts to find what effect some of these factors were having on the casualty rate before the 70 m.p.h. limit was applied were described in the Interim Report, but at that stage of the investigation the proportion of the variations in the rate that could be explained by the method then used was comparatively low (see Table A.3 of that Report). Further analysis, this time based on injury accidents, has led to an improvement in the method, which now accounts for a larger proportion of the variation in accident rate.

The method consists essentially of the application of a standard statistical process known as multiple linear regression. By this means injury accident rates per million vehicle-miles were related to a number of variables, the regression covering the six years 1960–65, where there was no 70 m.p.h. limit, each divided into 7-day periods in order to demonstrate the variations in accident rate.

The injury accident rate in each period was related to corresponding values of the following variables:—

(i) Time in years from January 1, 1960 (to take account of improvements such as better roads, safer vehicles, increased use of safety belts, and better medical services)

(ii) Motor vehicle-miles

(iii) Estimated proportion of traffic travelling in hours of darkness

(iv) Injury accidents on wet roads as proportion of all injury accidents

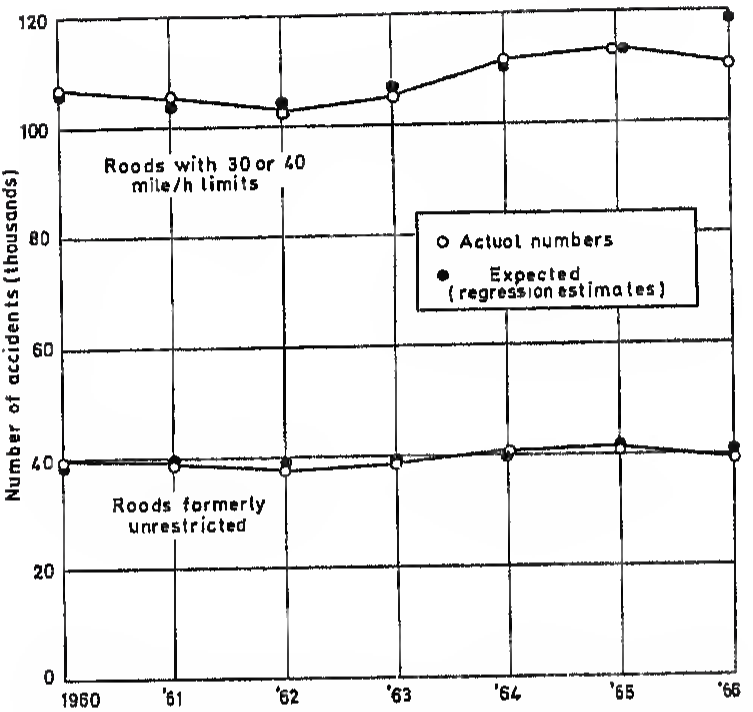

Fig. 8. Numbers of injury accidents on Trunk and Class I roads in Great Britain

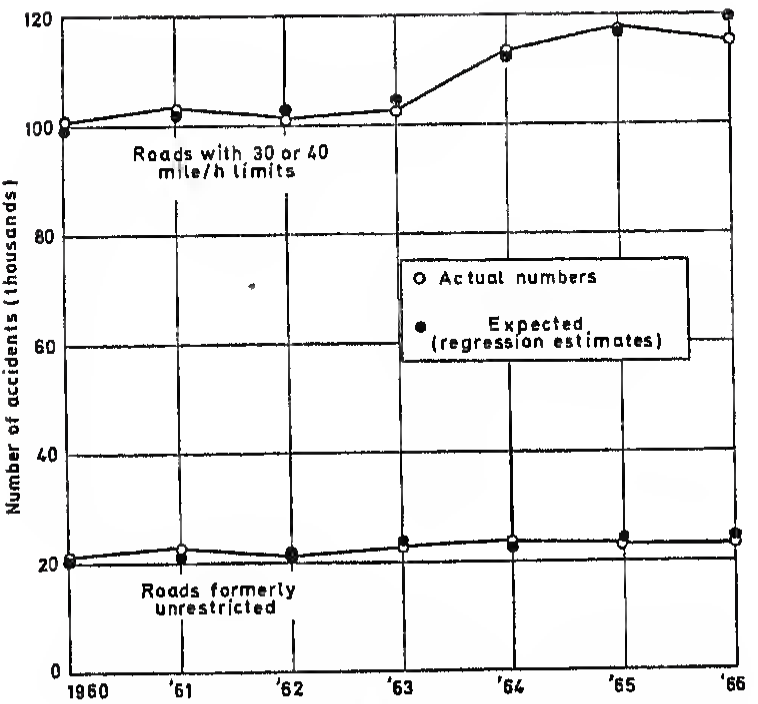

Fig. 9. Number of injury accidents on Class II, Class III, and unclassified roads in Great Britain

(95991)

(v) Injury accidents on icy roads as proportion of all injury accidents

(vi) Two-wheeled vehicles involved in injury accidents as a proportion of all vehicles involved.

The interactions between these variables were also taken into account.

Because the speed limit would be expected to have different effects on different kinds of road, separate regressions were calculated for main roads (i.e. Trunk and Class I roads) and other roads, each of these categories being further divided into those with 30 or 40 m.p.h. speed limits and those formerly without a speed limit. The latter group included a comparatively small mileage (about 400 miles) of roads which became subject to a permanent 50 m.p.h. speed limit during the summer of 1965. The effect of retaining the latter will be discussed later.

Table 21 shows the maximum percentage of the variation in injury accident rate that was explained by the improved regressions in each case. The regressions provided estimates of the expected accident rates in each 7-day period and by applying these to the known vehicle-mileages the expected numbers of injury accidents in each period were derived. The latter were then compounded to give annual expected totals for the years 1960–65, which were then plotted together with the actual numbers (given in Table 22). The results (in Figs. 8 and 9) show that agreement between observed and expected numbers for the years 1960–65 obtained by this method was close in all four cases, which justifies confidence in the calculation of the values that would have been expected in 1966 without the speed limit.

Roads formerly without a speed limit

On main roads formerly without a speed limit the difference between observed and expected numbers of injury accidents during the trial year was small—a reduction of about 5%. On other roads the reduction was less than 1%. The Interim Report[1] showed that on roads formerly unrestricted a reduction of 13% in the casualty rate occurred during the first three months of 1966 compared with the corresponding months of 1965. It should be noted that this was not the difference between actual and expected numbers, as in the present comparison, because at that stage the method used for prediction had not been sufficiently developed. However, as the actual number of accidents on main roads formerly without a speed limit was lower than the expected number calculated by the regression method (see Fig. 8), some of the favourable effects which the limit might have had in the first three months of 1966 on this class of road may have continued into the rest of the year.

Before drawing any conclusions from these reductions it is necessary to decide whether they could have occurred by chance and to make some allowance for the effect of the 50 m.p.h. speed limit, which was in operation for part of the time on some of the roads in this group. The category of Trunk and Class I roads described as "formerly unrestricted", which totals approximately 20 000 miles, includes about 400 miles which became subject to a permanent speed limit of 50 m.p.h. with effect from July and August 1965. The effect of including any accident savings on these roads in the total is small, as the following shows.

In 1966, 5% of the total casualties on Trunk and Class I roads formerly unrestricted occurred on those with a permanent 50 m.p.h. limit. A temporary speed limit of 50 m.p.h. had been imposed at summer weekends between 1961

and 1964 on a greater mileage of roads in this category and the results suggested a saving in injury accidents of up to 25%[4]. If a similar saving in casualties had occurred in 1966 on the roads subject to the permanent 50 m.p.h. limit this would have amounted to a reduction of 1½% in total casualties for this category as a whole. As there were periods during which some roads were subjected to a 50 m.p.h. limit in earlier years the effect of the permanent 50 m.p.h. limit would be even less than 1½%. In view of this small change the large amount of work involved in separating individual accidents on the roads now subject to 50 m.p.h. limits from the remainder in earlier years was not considered justified. Instead, if the reduction of up to 1½% in accidents which might be attributed to the 50 m.p.h. speed limit is subtracted from the 5% reduction already described there remains a reduction of about 3½% compared with the expected number on Trunk and Class I roads subject to the 70 m.p.h. speed limit. If it were assumed that the predicted value was exact, and allowed for all possible factors operating in 1966 except for the limit, then the fall of 3½% would be regarded as statistically significant. However, as there are mathematical difficulties (which are being pursued) in estimating the likely effects of these factors it is not possible to say whether this 3½% reduction is demonstrative of a real effect arising from the limit.

Roads with 30 or 40 m.p.h. speed limits

On roads with 30 or 40 m.p.h. limits the numbers of injury accidents and the rates per million vehicle-miles in 1966 were fewer than expected when calculated by the same method. Although the reasons for these differences are not at present understood they can hardly be associated with the 70 m.p.h. limit. Closer examination of the data shows that about three-quarters of the reduction in accidents on these roads between 1965 and 1966 occurred in the Metropolitan Police District, where injury accidents fell by about 6% between the two years, whereas on the remaining roads subject to 30 or 40 m.p.h. limits the reduction was less than 1%. It is estimated that between 1965 and 1966 traffic in London increased by about the same percentage as in other urban areas (i.e. by about 6%). This suggests that the factors responsible for the difference between observed and expected numbers of accidents in 1966, e.g. no waiting regulations and various traffic engineering measures, were operative only in London (and possibly other large towns) and did not affect conditions on rural roads.

Accidents on dual-carriageway roads

Because more vehicles travel at speeds over 70 m.p.h. on dual-carriageway roads than on single-carriageway roads a sample was drawn totalling about 100 miles of dual-carriageway roads, previously without a speed limit. These roads had remained unchanged, as far as could be ascertained, since the beginning of 1964 and the numbers of fatal and serious accidents and casualties on them were examined. The fatal and serious casualties on this sample of roads comprised about a quarter of all fatal and serious casualties on such dual-carriageway roads in each year. The results are given in Table 23. They show that between 1965 and 1966 both accidents and casualties were reduced considerably on the dual carriageways whereas on the remainder of the Trunk and Class I roads formerly without a speed limit (which includes the remaining relatively small but increasing mileage of dual-carriageway roads) there was

no change. The 70 m.p.h. speed limit therefore appears to have had a more beneficial effect on the numbers of accidents and casualties on dual-carriageway roads than on other Trunk and Class I roads. However, since the effect appears to be greater than the change in speeds would suggest (see Table 8), the extent to which the improvement can be attributed to the 70 m.p.h. speed limit is uncertain.

To sum up the foregoing accident studies, statistics for M.1 and M.4 supported by trends in the casualty figures for motorways as a whole indicate that during 1966 there was a sharp reduction—of the order of 20%—in the motorway casualty rate. On all-purpose dual-carriageways formerly without a speed limit there was also evidence of a reduced casualty rate but on other all-purpose main roads subject to the 70 m.p.h. speed limit conditions were only marginally safer than those predicted on the basis of past trends.

The only major change in road conditions operating in that year alone was the 70 m.p.h. speed limit trial and the increased police activity. The evidence suggests that most of the improvement on motorways, and possibly some of that on dual-carriageway roads, was due to the trial.

Accidents on roads in built-up areas generally were fewer than would have been expected but there is evidence that this reduction was largely confined to London, where nearly all roads are subject to 30 or 40 m.p.h. speed limits and only a trivial mileage was subject to the 70 m.p.h. speed limit.

ECONOMIC EFFECTS OF THE LIMIT

Two measurable economic effects of imposing a speed limit are:

(i) lowers speeds, which result in higher time costs, although these are to some extent offset by reduction in fuel and other operating costs;

(ii) a possible reduction in the numbers, and therefore in the cost, of accidents and casualties.

It is however very difficult to place precise values on the cost of time saving on some aspects of the cost of accidents. The calculations given below are therefore meant to indicate the effects of the limit and are not a precisely drawn up balance sheet.

There may have been some extra costs incurred by the police and the courts, because of increased police supervision and prosecutions, but since their net cost is likely to have been small and is difficult to estimate no allowance has been made for it.

If the cost of the accidents saved is greater than the increase in operating costs, including time costs, then as far as these two considerations are concerned the limit will have had a favourable measurable economic effect. There are, however, unmeasurable costs which have only been allowed for in an arbitrary manner or which have been excluded from this calculation; these include, amongst others, the bereavement and suffering that are associated with road accidents and the loss of the convenience and satisfaction that some people obtain from driving at speeds in excess of 70 m.p.h.

Speeds of vehicles other than cars do not appear to have been affected to any great extent by the 70 m.p.h. speed limit and it is therefore sufficiently accurate

to estimate the economic effects by considering cars only. The following calculations relate to the effect of the speed limit on the operating costs of cars on motorways and on other rural roads during 1966. This Report is concerned with the long term effect of the limit. The reduction in speeds found in the measurements taken shortly after the imposition of the limits was not fully maintained; these measurements have therefore been ignored in the following calculations.

Motorways

Effect on time and operating costs. The average increase in the journey time of cars on motorways at the three sites at which speed measurements were made was 2·6 seconds per car-mile (i.e. 4·3 minutes on a 100-mile journey). It is estimated that there were 2300 million car-miles on all motorways during 1966 and the total increase in journey time of cars on them was therefore about 1660 thousand hours. The Laboratory's estimate of the value of the time of occupants of cars at 1966 prices, including a value for non-working time at three-quarters of the rate for working time, is 224 pence per car per hour; this value is updated from the value for 1965[5]. The cost of the extra journey time to car occupants on motorways was therefore about £1 550 000.

Down to speeds of about 40 m.p.h. a reduction in the speed of cars leads to lower petrol consumption. Investigations carried out by the Laboratory some years ago[6,7] and the preliminary results of work in progress show that at motorway speeds a reduction of 1 m.p.h. in the speed of a car would lead to a saving of 0·075 gallons per 100 miles. Thus the average observed reduction in car speeds of 2·7 m.p.h. on motorways leads to a total saving of £465 000 when petrol is valued net of tax. (This reduction in speed is slightly less than the reduction shown in Table 2, since it is based on the change in journey times whereas the figures in Table 2 are the averages of the measured speeds.) American data[8] suggest that at high speeds the value of the reduction of other operating costs (tyres, oil, etc.) as a result of travelling at a lower speed is about one-third of the reduction in fuel costs. Thus the estimated total reduction in running costs of cars on motorways in 1966 is £620 000.

The net effect on motorways of the speed limit was therefore to increase total operating costs of cars (i.e. time and vehicle running costs), by about £1 550 000 − £620 000 = £930 000.

Effect on accident costs. The change in the number of casualties on motorways following the introduction of the 70 m.p.h. limit is given in Table 9. In order to assess the corresponding reduction in accidents it has been assumed that the average number of each class of casualty in each severity of accident was the same for the accidents saved in 1966 as for motorway accidents as a whole in 1965. The estimation of the reduction in the number of non-injury accidents has been based on the change in the proportion of injury to non-injury accidents (see Table 11) and the average number of non-injury accidents per injury accident that was previously found on motorways[9].

The average cost of accidents in 1966 has been based on estimates for 1965[9], increased by 4% to allow for increases in costs since then. These estimates include all " measurable " costs (vehicle damage, medical expenses, loss of output, etc.), plus an arbitrary subjective cost of £5000 per fatality and £200 per serious injury which we assume the community would be prepared to pay in order to prevent these casualties. The estimate of the saving in total accident costs is given in Table 24.

Estimated overall economic effect of the limit on motorways. The overall effect of the 70 m.p.h. limit on motorways is given in Table 25, which shows that the overall economic effect of the limit on motorways was a net reduction in costs when subjective costs are included. However, the margin of uncertainty in each of the four components in Table 25 is such that it is not possible to be certain whether the true overall effect was an increase or a decrease in costs.

Rural all-purpose roads

For the purpose of this calculation rural all-purpose roads have been divided into dual carriageways, three-lane roads and two-lane roads. Each category contains a much wider variety of conditions than is found on motorways and a reliable overall economic assessment of the effect of the 70 m.p.h. limit on speeds cannot be made from measurements at only two sites. The site where the dual carriageway speed measurements were made was on a fast stretch of new road where speeds are likely to have been above the average for all rural dual carriageways. The three-lane site was also on a fast stretch of road where speeds were probably above the average for this class of road.

About three-quarters of rural car mileage is travelled on two-lane roads and the great majority of these roads will have been virtually unaffected by the imposition of the 70 m.p.h. speed limit. If the relation between the speed before the limit and the reduction in speed with the limit found on the wider roads is extended, then at the speeds experienced on two-lane roads appreciable decreases in speed would be expected on only a small proportion of the mileage. By ignoring the speed changes that would have occurred on a few stretches of two-lane roads the effect of the speed limit on operating costs will be underestimated. On the other hand, there is probably an overestimate which results from using the observed average car speeds for dual carriageways and three-lane roads, which are probably higher than the averages for these two classes of roads as a whole.

The average increases in journey time and the estimated costs of these increases are shown in Table 26. The changes in journey times were estimated from the distribution of observed speeds.

The proportions of the rural vehicle-mileage travelled on each type of road were estimated from Table 33 of Road Research Technical Paper No. 62[10] and from the increases in the mileage of dual carriageway since 1960. It was assumed that cars accounted for 70% of total vehicle-mileage on all roads regardless of width. Vehicle hours were costed in the same way as for motorways. The reductions in fuel consumption per mile for a reduction in speed of 1 m.p.h. at the levels of speed concerned are estimated to be 0·075 gallons per 100 miles on dual carriageways and 0·05 gallons per 100 miles on three-lane roads. The extra cost associated with slower journeys on rural all-purpose roads is approximately one and a half million pounds, plus an amount probably much smaller for two-lane roads.

From a sample length of dual-carriageway roads it appears that there have been reductions in the numbers of fatal and serious accidents and casualties on them (see Table 23). However, owing to the small size of the sample, the fact that accident data in respect of slight accidents on dual-carriageway roads are not recorded, and the fact that separate cost figures are not available, the value of the reductions on dual-carriageway roads have not been calculated separately.

It appears (see Figs. 8 and 9) that there was a reduction of about 1400 injury accidents on rural Trunk and Class I roads and a negligible reduction on other rural roads. This reduction in accidents was valued at the average cost of rural accidents, including an allowance for the cost of associated damage accidents and for arbitrary subjective costs in 1965[9] increased by 4% to allow for increases in costs between 1965 and 1966. The estimated saving is about £2·2 million which is approximately 1½ times the estimated increase in operating costs. Owing to the uncertainty surrounding many of the figures involved in this calculation the results cannot be considered conclusive.

MOTORISTS' VIEWS ON THE 70 M.P.H. SPEED LIMIT

A number of surveys were made among motorists to find out how many were directly affected by the 70 m.p.h. limit, how many knew about it, and their opinions of it.

The discussion here will take into account two postal surveys carried out among motorists by the Laboratory and three surveys involving personal interviews which were carried out by National Opinion Polls Ltd. Random sampling methods were used to select names and addresses in all these enquiries and the response rates achieved were 80% or more. The smallest of these enquiries involved 347 motorists, while in each survey drivers from the whole of England and Wales were represented in the sample. Thus considerable efforts were made to ensure that the opinions collected reflected those of the general population and the numbers were sufficiently large to make it unlikely that the estimates of opinion differ from the true level by $\pm$ 7%, even in the smallest sample.

Some minor reservations have to be made about the data obtained in four of these enquiries. In all of these, only electors were included and Scotland was not included. In the enquiries conducted by the Laboratory, the fact that the respondents knew that the enquiry was being made by the Ministry concerned could have biassed their replies. The first two National Opinion Polls' enquiries used a rather special definition of a motorist (the "primary petrol buyer"—a person who has a car at home and who buys most of the petrol for it), while in the Laboratory enquiries a motorist was defined as anyone who said "yes" when asked "Do you drive?"

The fifth, and last enquiry, carried out by National Opinion Polls in February, 1967, was an improvement on the earlier enquiries in several respects. A wider area was covered because the sample was drawn at random from households in England, Wales and Scotland. The age range was also extended to include people of all ages legally permitted to drive. A more inclusive definition of a motorist was applied, leading incidentally to an increase in the number of respondents whose views could be considered (all who had a current driving licence and who had driven in the last 12 months were included: there were 767 people of this kind whereas there were only 478 to whom the earlier National Opinion Polls definition of a "primary petrol buyer" applied).

Another possible source of bias was removed because the interviewers did not inform respondents that the enquiry was being done on behalf of the Ministry of Transport.

The extent to which motorists are affected

The National Opinion Polls enquiry in February 1967 showed that 28% of the 767 motorists interviewed normally never drove a vehicle capable of going over 70 m.p.h. (i.e. apart from holiday times). Seventeen per cent normally drove such a vehicle on two days a week or less. Seven per cent did so on three or four days a week and 46% did so on five days a week or more (2% did not reply to this question).

Those who do not use roads where it is possible to drive at more than 70 m.p.h. would also not be affected by the 70 m.p.h. speed limit. In the 1967 survey, 25% of the motorists said they never drove on a motorway, 50% did so less than once a month, 17% did so between once a week and once a month and 6% did so more often than once a week. Motorists were also asked how often they normally drove on other fast main roads where speeds of over 70 m.p.h. can be reached*: 5% of motorists never drove on such roads, 20% did so less than once a month, 32% did so between once a month and once a week, and 41% did so more than once a week.

Overall, 70% of motorists were affected by this speed limit in that they sometimes drove vehicles which can go at over 70 m.p.h., and in that they also sometimes used a motorway and/or other fast main road.

Knowledge of existence of the 70 m.p.h. limit

It seemed relevant to enquire how many motorists knew that there was a 70 m.p.h. speed limit. The survey in February 1967 showed that 95% of motorists thought that there was a speed limit on motorways, 3% thought that there was not a speed limit, and 2% did not know. Among those who thought there was a speed limit, 94% cited 70 m.p.h., 2% did not know what it was and 4% gave higher or lower figures. Thus 90% of all the motorists knew that there was a speed limit of 70 m.p.h. on motorways.

Fewer knew about the speed limit on other fast main roads. Eighty-two per cent said that there was a speed limit on such roads, 13% said there was not and 5% did not know. Of the 628 motorists who said there was a limit, only 49% cited 70 m.p.h. Almost as many cited lower speeds, with 1% quoting a speed between 60 and 69 m.p.h., 33% a speed between 50 and 59 m.p.h. and 14% a speed of 49 m.p.h. or less, and 3% did not know. Thus out of all motorists, only 40% knew that there was a speed limit of 70 m.p.h. on other fast main roads.

As would be expected, those who drive fast vehicles, those who drive larger mileages, those who often drive on motorways, and those who drive often on fast roads other than motorways, are more likely to be aware of the existence of these speed limits and are more likely to name the correct speed for each limit.

Current views on the 70 m.p.h. speed limit

In the February 1967 survey, after having been informed that there was a trial 70 m.p.h. speed limit in operation on motorways, all motorists were asked

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* The questions on 'fast main roads' were introduced in this way: "Now I am going to talk about *other* fast main roads—not motorways. A fast main road is a road where speeds of over 70 m.p.h. can be reached—not roads which already have 30, 40 or 50 m.p.h. limits"

if they thought it was a good thing to have a *trial* speed limit of 70 m.p.h., or not. Seventy-seven per cent said that they thought it was a good thing, 21% said that it was not and 2% did not know.

They were then asked: "Do you feel it would be a good thing to have a *permanent* speed limit of 70 m.p.h. on motorways, or not?" Sixty-one per cent of motorists said that they felt that this would be a good thing, 36% that it would not and 3% did not know. Those who said it would not be a good thing (278 motorists) were asked "Do you think there should be some permanent maximum speed limit for motorways, or not?" Of these, 42% said there should be, 55% said there should not and 3% did not know. Of those 117 drivers who said that there should be a maximum speed limit, but not 70 m.p.h., 31% wanted speeds of less than 70 m.p.h. Details of the speeds these motorists wanted are shown in Table 27. It is of interest that rather more wanted a speed higher than 70 m.p.h. than wanted a speed lower than 70 m.p.h. To sum up, 61% of all motorists were in favour of a permanent speed limit of 70 m.p.h. on motorways, and a total of 65% wanted a permanent speed limit on motorways of 70 m.p.h. or less.

After having been told that there was a trial 70 m.p.h. speed limit at present on all fast roads (other than motorways), all motorists were asked if they thought it was a good thing to have a *trial* speed limit of 70 m.p.h., or not. Seventy-seven per cent said they thought this was a good thing, 21% said that it was not and 2% did not know.

They were then asked: "Do you feel that it would be a good thing to have a *permanent* speed limit of 70 m.p.h. on all fast main roads, or not?" Sixty-seven per cent of motorists said that this would be a good thing, 30% said that it would not and 3% did not know. Those who said it would not be a good thing (234 motorists) were asked: "Do you think there should be some permanent maximum speed limit for fast main roads, or not?" Of these, 68% said they thought there should be, 29% said that there should not and 3% did not know. Of the 160 motorists who thought that there should be a maximum speed limit on fast main roads, but not of 70 m.p.h., 80% wanted speeds of less than 70 m.p.h. Details of the speeds these motorists wanted are shown in Table 27. It is of interest that many more motorists wanted a speed lower than 70 m.p.h. than wanted a speed which was higher than 70 m.p.h., a marked difference from the opinions prevailing among those who wanted a speed other than 70 m.p.h. as a maximum speed limit on motorways. To sum up, 67% of all motorists were in favour of a permanent 70 m.p.h. speed limit on fast main roads, and a total of 83% wanted a permanent speed limit on fast main roads of 70 m.p.h. or less.

Differences between people in views held about the 70 m.p.h. limit

It was of interest to see whether opinions on the 70 m.p.h. speed limit varied between different groups of people and particularly to see whether those groups which are personally affected have very different views from others. Table 28 shows how opinions on having such a speed limit on motorways varied between groups in February 1967. Those without a current driving licence were less likely to give a definite opinion, but apart from this the main finding is that those most affected are the least likely to be in favour of a permanent 70 m.p.h. or lower speed limit on motorways. This applies when motorists are compared with non-motorists, and also when different sub-groups of motorists are examined. The

differences are often quite large and in each case are statistically significant at the 1 in 100 level or more.

Table 29 shows similar data for the questions on other fast main roads. Again, non-motorists are less likely to give a definite opinion, but otherwise the differences between the groups tend to be smaller than in Table 28 on motorways. Taking the percentages of people who are in favour of a permanent speed limit of 70 m.p.h., or a lower speed, the only difference of any magnitude between groups, and the only difference which is statistically significant, relates to the mileage driven by the motorist. Those who drive more miles are less in favour of such a limit.

Changes in views on the speed limit since its introduction

Comparisons are difficult because of changes in the form of the questions, but Tables 30 and 31 suggest that in February 1967 electors and motorists were as much in favour of the speed limit as they were in December 1965 before it was brought into force. Among electors and among "primary petrol buyers" (the National Opinion Polls' definition of a motorist used in the first two surveys) it appears that the 70 m.p.h. limit had become more acceptable with time (Table 30). In December 1965 the Laboratory survey showed that about half the motorists felt that both the number of accidents and the seriousness of those which occurred, would be unaffected by the introduction of the 70 m.p.h. limit.

Ways in which the 70 m.p.h. limit has made driving more difficult

All respondents in the February 1967 enquiry were asked if the 70 m.p.h. speed limit had made things more difficult for car drivers on motorways. Twenty-five per cent of motorists said that it had, 66% that it had not and the rest did not know; those defined as motorists in this enquiry would of course have included some who did not drive cars. The various ways in which motorists say that things had been made more difficult are listed in Table 32. Those which are most common refer to queueing or bunching and to the lack of a sufficient margin of speed for overtaking.

All respondents were asked a similar question referring to other fast roads. To this, 12% of motorists replied that the speed limit had made things more difficult for car drivers, 82% said it had not and 6% did not know. Queueing and bunching are the most commonly cited disadvantages, but full details are shown in Table 33.

CONCLUSIONS

Speed Studies

1. On motorways the introduction of the speed limit was followed by a marked reduction in the numbers of cars travelling at high speeds. Despite a subsequent increase in speeds they were still much lower than before the 70 m.p.h. limit came into operation. One year after the speed limit had been introduced, speeds had more or less stabilized; the number of cars exceeding 70 m.p.h. on motorways was then one-half of that before and the number exceeding 80 m.p.h. was one-quarter of that before.

2. Only a very small proportion of goods vehicles exceeded 70 m.p.h. on motorways before the speed limit was introduced and the effect of the limit on these vehicles was slight and was not maintained.

3. Speed measurements on fast rural roads showed that the speed limit had caused some reduction in speeds on a small proportion of such roads. However, the majority of rural roads are much slower than these and it is estimated that the proportion of vehicles exceeding 70 m.p.h. on such roads was too small for the speed limit to have had any appreciable effect on speeds as a whole.

Accidents on motorways

4. It is estimated that in 1966 with the 70 m.p.h. speed limit in operation there were some 480 fewer fatalities and casualties on motorways as a whole (a reduction of about 20%) than would have been expected without the speed limit. This reduction includes 58 fewer people killed.

5. In clear weather on a 73-mile length of M.1/M.10/M.45 during the trial period

(i) The accident rate (injury and non-injury combined) was the lowest recorded and was significantly lower (by 10%) than the average for the previous 5 years;

(ii) the proportion of accidents resulting in injury (49%) was the lowest recorded;

(iii) there was no increase in the number of accidents involving vehicles running into the rear of other vehicles nor of multiple-vehicle accidents;

(iv) the risk of skidding in accidents was lower and the decline in the rate of accidents due to burst tyres was continued.

6. There were reductions in the accident and casualty rates of 30% (a significant change) and 12% respectively on the Slough and Maidenhead By-passes (M.4) during the trial year.

Accidents on all-purpose roads

7. During the speed limit trial injury accidents on all-purpose main roads subject to the 70 m.p.h. speed limit were about 3½% fewer than would have been expected without the limit, but it is not possible at present to say whether this is demonstrative of a real effect.

On other all-purpose roads subject to the 70 m.p.h. speed limit there appears to have been virtually no change in the number of injury accidents compared with expected. The speed limit probably had little or no effect on this group of roads because speeds as high as 70 m.p.h. are possible on only a small proportion of them.

Between 1965 and 1966 there were greater reductions in fatal and serious accidents and casualties on dual carriageway roads formerly without a speed limit, where high speeds were possible, than on single carriageway roads. However, the extent to which this improvement can be attributed to the 70 m.p.h. speed limit is uncertain.

Economic effect

8. Allowing for longer journey times, reduced operating costs and accident savings, including subjective costs, there were probably net reductions in the costs of the use of motorways and of rural Trunk and Class I roads during the trial year but these results cannot be considered conclusive.

Public opinion

9. In February, 1967, a survey showed that 61% of motorists were in favour of a permanent speed limit of 70 m.p.h. on motorways, and a total of 65% wanted a permanent speed limit on motorways of 70 m.p.h. or less. Sixty-seven per cent of the motorists were in favour of a speed limit of 70 m.p.h. on fast main roads other than motorways and a total of 83% wanted a speed limit of 70 m.p.h. or less.

General Conclusion

During the 70 m.p.h. speed limit trial there was a marked reduction in the speeds of cars on motorways and an accompanying reduction of about 20% in motorway casualties compared with expected.

On all-purpose main roads subject to the 70 m.p.h. speed limit there was only a slight reduction in speeds and a small reduction in accident rates during the trial year. On the remaining all-purpose roads there was virtually no difference between the actual and expected numbers of accidents.

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APPENDIX

Notes and Definitions

The statistics of accidents and casualties used in this investigation are compiled from reports submitted by the Police.

A report is made, in a standard form, for every accident on the public highway resulting in injury, fuller details being reported for those which result in death or serious injury than for slight accidents.

The police also maintain records (in less detail) of accidents which do not result in injury. It is assumed that the standard of reporting of accidents has not changed during the period studied.

The estimates of vehicle mileage are based on counts of traffic made at the Laboratory's permanent traffic census sites.

Definitions of terms

Accident: An event resulting in injury or damage occurring on the public highway (including footways) in which a vehicle is concerned.

Killed: Died within 30 days of being injured in a road accident.

Serious injury: An injury for which a person is detained in hospital as an "in-patient", or any of the following injuries whether or not he is detained in hospital: fractures, concussion, internal injuries, crushings, severe cuts and lacerations, severe general shock requiring medical treatment.

Slight injury: An injury of a minor character such as a sprain or bruise.

Vehicles involved in accidents: Vehicles in collision, vehicles whose drivers or passengers are injured and vehicles which contribute to the accident.

Hours of darkness: Half an hour after sunset to half an hour before sunrise. This coincides with "lighting-up time".

Motorways: These are roads to which the Motorway Traffic Regulations apply, e.g. M.1, M.6, M.10, Doncaster By-pass (A.1 (M)).

Statistical significance: Apparent reductions (or increases) in accidents would always occur even if there were no real change in the long run. A reduction is regarded as *statistically significant* at the 5% level if the chance of such a reduction, or a larger one, is less than 5 in 100 calculated on the hypothesis of no real change. Significance at the 5% level (1 in 20) is usually regarded as good evidence of a real change and significance at the 10% level (1 in 10) as an indication of a likely change.

Trial year: For convenience the calendar year 1966 and the 12 month period beginning at noon on December 22nd are both referred to in this Report as the *trial year*, i.e. that period subject to the 70 m.p.h. speed limit that is used for comparison with similar periods when there was no speed limit.

Severity: The severity of an injury has been defined above. It is sometimes useful, however, to refer to the severity of an accident (i.e. as fatal, serious or slight) according to the degree of injury of the most seriously injured casualty.

Table 1

Trends in the speeds of cars on motorways
(average for M.1 and two sites on M.4)

	% over 70 m.p.h.	% over 80 m.p.h.	Mean speed (m.p.h.)	Standard deviation (m.p.h.)	Number of car speeds measured
Mid-December 1965	29	8	64·2	11·3	5831
	(Speed limit introduced 22nd December 1965)				
January/February 1966 ..	10	1	60·3	8·5	4846
April/May 1966	15	2	61·2	9·4	5391
September 1966	16	3	61·0	9·8	6887
December 1966/January 1967	16	2	61·8	9·2	4992
March/April 1967	(14)*	(1)*	(60·7)*	(9·7)*	(4683)*

* Two sites on M.4 only.

Table 2

Speeds of cars at three sites on motorways just before and one year after introduction of speed limit

	% over 70 m.p.h.			% over 80 m.p.h.			Mean speed (m.p.h.)			Standard deviation (m.p.h.)		
	Before*	After†	After / Before	Before*	After†	After / Before	Before*	After†	Change	Before*	After†	After / Before
M.1. dual 3-lane: Daylight	30	16	0·5	8	2	0·25	65·2	62·2	−3·0	10·7	8·5	0·8
M.4. dual 3-lane: Daylight	25	15	0·6	8	2	0·25	62·8	61·4	−1·4	12·1	9·2	0·8
Darkness	29	15	0·5	9	2	0·2	63·8	60·0	−3·8	12·2	10·0	0·8
M.4 dual 2-lane: Daylight	32	17	0·5	9	2½	0·3	64·7	61·9	−2·8	11·6	9·4	0·8
Average all sites			0·5			0·25			−2·8			0·8

* Mid-December 1965.
† December 1966/January 1967.

Table 3

Percentages of cars travelling at different speeds on motorways (average for M.1 and two sites on M.4) just before and one year after introduction of the 70 m.p.h. speed limit

	Before*		After†		Change	
Under 40 m.p.h.	1		1		0	
40–45 m.p.h.	3		3		0	
45–50 m.p.h.	6	37	7	39	+ 1	+ 2
50–55 m.p.h.	10		11		+ 1	
55–60 m.p.h.	17		17		0	
60–65 m.p.h.	18	34	24	45	+ 6	+11
65–70 m.p.h.	16		21		+ 5	
70–75 m.p.h.	12		10		− 2	
75–80 m.p.h.	9		4		− 5	
80–85 m.p.h.	4	29	1	16	− 3	−13
85–90 m.p.h.	2		1		− 1	
Over 90 m.p.h.	2		0		− 2	
TOTAL	100		100		0	
Number of car speeds measured	5831		4992		−839	

* Mid-December 1965.
† December 1966/January 1967.

Table 4

Speeds of vehicles in the offside (third) lane of M.1, just before and one year after introduction of 70 m.p.h. speed limit*

	Before (mid-December 1965)	After (January 1967)
Per cent over 70 m.p.h.	61	37
Per cent over 75 m.p.h.	37	16
Per cent over 80 m.p.h.	20	6½
Per cent over 85 m.p.h.	10	2
Per cent over 90 m.p.h.	4½	1
Per cent over 95 m.p.h.	2	0
Mean speed	73	68
Standard deviation (m.p.h.)	9·4	7·5
Number of speeds measured	785	552
Flow in offside lane (vehicles per hour)	132	95

* 95 per cent were cars.

Table 5

Use of the offside (third) lane on M.1

	% of all cars which used the offside lane	
	Actual	Adjusted*
Mid-December 1965..	35	35
(Speed limit introduced 22nd December 1965)		
February 1966	26	27
April 1966	32	31
September 1966	27	24
January 1967	24	24

* Adjusted to allow for variations in traffic flow (on the carriageway as a whole) from one set of measurements to another; based on a known tendency for the proportion of vehicles in the offside (third) lane to increase with increasing traffic flow on the whole carriageway (see *Road Research 1963*, page 17).

Table 6

Speeds of goods vehicles on M.1 just before and on two occasions after introduction of speed limit

Class of vehicle	% over 60 m.p.h.			% over 70 m.p.h.			Mean speed (m.p.h.)			Standard deviation (m.p.h.)		
	Before (mid-Dec. 1965)	After		Before (mid-Dec. 1965)	After		Before (mid-Dec. 1965)	After		Before (mid-Dec. 1965)	After	
		Feb. 1966	Jan. 1967		Feb. 1966	Jan. 1967		Feb. 1966	Jan. 1967		Feb. 1966	Jan. 1967
Light goods (up to 1½ tons unladen) ..	24	20	24	1	½	½	54·5	53·9	54·5	7·5	7·5	7·3
Medium goods (2 axles)	1	1	1	0	0	0	46·5	45·3	46·2	6·1	6·1	6·2
Heavy goods (3 or more axles) ..	0	½	0	0	0	0	43·1	42·2	44·0	6·4	6·2	6·0

Table 7

Trends in the percentage of cars exceeding 70 m.p.h. at 2 sites on all-purpose main roads

	A.1 (Dual 2-lane)		A.412 (3-lane)
	Daylight	Darkness	Daylight
Mid-December 1965 ..	14	9	3
(Speed limit introduced 22nd December 1965)			
January/February 1966 ..	6	7	1
May/June 1966	10	9	$2\frac{1}{2}$
September 1966	10	7	$2\frac{1}{2}$
December 1966	5	*	*

* No measurements made.

Table 8

Speeds of cars at two sites on all-purpose main roads shortly before and nine months after introduction of speed limit

	% over 70 m.p.h.			% over 80 m.p.h.			Mean speed (m.p.h.)			Standard deviation (m.p.h.)		
	Before*	After†	After / Before	Before*	After†	After / Before	Before*	After†	Change	Before*	After†	After / Before
A.1 dual 2-lane:												
Daylight	14	10	0·7	2½	1½	0·6	59·2	57·5	−1·7	10·0	9·8	1·0
Darkness	9	7	0·8	2	½	0·3	56·8	55·1	−1·7	9·8	10·0	1·0
A.412 3-lane:												
Daylight	3	2½	0·8	0	½	—	49·9	48·3	−1·6	8·8	9·8	1·1

* Mid-December 1965.
† September 1966.

Table 9

Casualties on all motorways in Great Britain

	1964	1965	1966
Miles in use at:			
January 1st	290	300	380
December 31st	300	380	444
Approximate vehicle miles travelled (millions)	1867	2717	3393
Casualties:			
Killed	96	119	92
Seriously injured	498	595	667
Slightly injured	1005	1323	1266
All casualties	1599	2037	2025
Percentage killed or seriously injured	37	35	37
Casualties per million vehicle miles:			
Killed	0·051	0·044	0·027
Seriously injured	·27	·22	·20
Slightly injured	·54	·49	·37
All casualties	·86	·75	·60

Table 10A

Total casualties and traffic on motorways

	2-lane (111 miles)	M.1, 3-lane (56 miles)	M.6, 3-lane (79 miles)	Others (Length increasing)
1964				
Vehicle-miles (millions)	532	491	523	321
Casualties	526	516	396	161
1965				
Vehicle-miles (millions)	630	545	632	910
Casualties	496	560	494	487
1966				
Vehicle-miles (millions)	701	596	708	1388
Casualties	446	506	412	661

Table 10B

Actual and expected casualties on motorways in 1966

(i) *Totals*

	Actual	Expected	Expected—Actual
2-lane (111 miles)	446	617	171
M.1, 3-lane (56 miles)	506	618	112
M.6, 3-lane (79 miles)	412	545	133
Other motorways	661	728	67
TOTAL	2025	2508	483

(ii) *By severity*

	Actual	Expected	Expected—Actual
Killed..	92	150	58
Seriously injured	667	752	85
Slightly injured	1266	1606	340
TOTAL	2025	2508	483

Table 11

Accidents and casualties on 73 miles of M.1/M.10/M.45—12 month periods beginning noon December 22nd

	Accidents				Casualties			
	In fog		Not in fog		In fog		Not in fog	
	Injury	Non-Injury	Injury	Non-Injury	Fatal	Non-Fatal	Fatal	Non-Fatal
1960–61 ..	13	25	202	182	1	45	18	348
1961–62 ..	34	44	233	179	2	49	26	364
1962–63 ..	18	19	294	221	0	36	25	443
1963–64 ..	43	47	292	254	4	93	36	493
1964–65 ..	11	36	327	280	0	16	39	597
1965–66 ..	10	10	293	305	1	12	30	535

Table 12

Accidents and casualties per million vehicle-miles on 73 miles of M.1/M.10/M.45 not in fog (12 month periods beginning noon Dec. 22nd)

	Accidents			Casualties (including killed)
	Injury	Non-injury	All accidents	
1960–61	0·47	0·43	0·90	0·85
1961–62	0·52	0·40	0·92	0·87
1962–63	0·56	0·42	0·98	0·90
1963–64	0·51	0·44	0·95	0·92
1964–65	0·51	0·43	0·94	0·99
1965–66	0·42	0·43	0·85	0·80

Table 13

Accidents on 73 miles of M.1/M.10/M.45— 12 month periods beginning noon Dec. 22nd

Vehicles involved	1961–62		1962–63		1963–64		1964–65		1965–66	
	Fog	Not Fog	Fog	Not Fog	Fog	Not Fog	Fog	Not Fog	Fog	Not Fog
1	40	192	8	229	36	219	17	247	7	230
2	24	193	19	251	35	272	20	298	10	289
3	9	25	3	26	8	44	7	38	1	52
4	2	2	2	8	4	9	1	13	1	16
5	1	0	1	0	0	1	1	4	0	6
6 or more ..	2	0	4	1	7	1	1	7	1	5
Total accidents	78	412	37	515	90	546	47	607	20	598
Av. number of vehicles per accident	1·90	1·60	2·61	1·64	2·82	1·73	1·98	1·78	2·05	1·84
Percentage involving 3 or more vehicles	18	7	27	7	21	10	21	10	15	13

Table 14

Accidents (injury and non-injury) on 73 miles of M.1/M.10/M.45 not in fog, in which one of the vehicles involved was hit in the rear—12 month periods beginning noon December 22nd

	Manoeuvre of vehicle that was hit				Relative rate of col. (3) per million veh. miles not in fog
	Stationary on hard shoulder (1)	Stationary on carriageway (2)	Moving on carriageway (3)	Not known (4)	
1960–61	6	12	93	2	100
1961–62	8	19	94	6	96
1962–63	12	16	133	3	117
1963–64	9	15	153	9	122
1964–65	9	32	160	17	114
1965–66	11	40	158	16	103

Table 15

*Accidents and casualties on 11½ miles of Slough and Maidenhead Bypasses (M.4)**

	Accidents				Casualties			
	In fog		Not in fog		In fog		Not in fog	
	Injury	Non-Injury	Injury	Non-Injury	Fatal	Non-Fatal	Fatal	Non-Fatal
1963–64 ..	3	3	39	48	0	5	2	70
1964–65 ..	4	5	67	65	0	6	4	102
1965–66 ..	5	4	56	51	1	5	8	100

* 12 months periods beginning December 22.

Table 16

*Accidents and casualties per million vehicle-miles not in fog on 11½ miles of Slough and Maidenhead Bypasses (M.4)**

	Accidents			Casualties (including killed)
	Injury	Non-injury	All accidents	
1963–64	0·42	0·52	0·94	0·78
1964–65	0·52	0·51	1·03	0·82
1965–66	0·36	0·33	0·69	0·70

* 12 months periods beginning December 22.

Table 17

Accidents (injury and non-injury) apparently caused by tyre failures on 73 miles of main carriageway of M.1/M.10/M.45

Year	Number of accidents apparently caused by tyre failure	Number per million vehicle-miles
1960	70	0·19
1961	64	0·15
1962	74	0·16
1963	79	0·15
1964	67	0·11
1965	85	0·13
1966	75	0·11

Table 18

Skidding in all accidents (injury and non-injury) on 73 miles of M.1/M.10/M.45

Year	Road dry		Road wet		Road icy	
	Total accidents	Percentage involving skidding	Total accidents	Percentage involving skidding	Total accidents	Percentage involving skidding
1960	276	19	164	41	37	87
1961	259	24	117	44	28	96
1962	246	24	177	45	59	83
1963	306	26	180	49	71	72
1964	369	35	230	54	21	76
1965	381	40	245	54	30	83
1966	324	29	230	50	41	68

Table 19

(i) *Injury accidents per million vehicle-miles on samples of 2-lane and 3-lane motorways*

	2-lane (111 miles)		3-lane (135 miles)	
	Jan.–May	June–Dec.	Jan.–May	June–Dec.
1965	0·44	0·41	0·44	0·45
1966	0·39	0·33	0·38	0·38*
Percentage change	−11	−20	−14	−16

(ii) *Casualties per million vehicle-miles on samples of 2-lane and 3-lane motorways*

	2-lane (111 miles)		3-lane (135 miles)	
	Jan.–May	June–Dec.	Jan.–May	June–Dec.
1965	0·80	0·78	0·82	0·94
1966	0·73	0·58	0·67	0·72*
Percentage change	−9	−26	−18	−23

* Heavy goods vehicles prohibited in offside (third) lane.

Table 20

Accident and casualty rates on M.1/M.10/M.45 per million vehicle-miles not in fog (noon December 22nd to March 31st)

	Accidents			Casualties (including killed)
	Injury	Non-injury	All accidents	
1960–61	0·46	0·53	0·99	0·67
1961–62	0·62	0·52	1·14	0·99
1962–63	0·61	0·60	1·21	0·85
1963–64	0·60	0·56	1·16	0·87
1964–65	0·60	0·51	1·11	0·99
1965–66	0·46	0·43	0·89	0·86
1966–67	0·48	0·48	0·96	0·85

Table 21

Percentage of variation in injury accident rate explained by regression analysis

	Percentage	
Roads with 30 or 40 m.p.h. speed limit:		
Trunk and Class I roads	83 (winter)	82 (summer)
Other roads	61 (winter)	78 (summer)
Roads formerly unrestricted:		
Trunk and Class I roads	79	
Other roads	74	

Table 22

Numbers of injury accidents on roads of Great Britain (excluding motorways)

	Roads with 30 or 40 m.p.h. speed limit		Roads formerly unrestricted	
	Trunk & Class I	Other roads	Trunk & Class I	Other roads
1960	106 790	100 627	39 912	21 618
1961	105 736	103 067	38 929	22 289
1962	102 858	101 308	37 451	21 262
1963	105 704	102 526	38 837	22 279
1964	111 836	113 268	40 494	23 911
1965	113 530	117 279	40 996	23 850
1966	110 582	115 261	39 901	23 915

Table 23

Fatal and serious accidents and casualties on Trunk and Class I roads formerly without a speed limit—Great Britain

	On approx. 100 miles of dual-carriageway roads formerly without a speed limit	On all other Trunk and Class I roads without a speed limit*
Fatal and serious accidents:		
1964	298	16 812
1965	357	17 156
1966	312	16 952
Percentage change 1965–66 ..	−13%	−1%
Fatal and serious casualties:		
1965	484	23 984
1965	583	24 776
1966	459	24 867
Percentage change 1965–66 ..	−21%	0

* Including the remaining, relatively small mileage of dual-carriageway roads.

Table 24

Estimated reduction in the cost of motorway accidents in 1966 following the introduction of the 70 m.p.h. speed limit

Class of accident	Cost per accident		No. of accidents saved	Total Saving	
	Measurable costs	Subjective costs		Measurable costs	Subjective costs
	(£)	(£)		(£000)	(£000)
Fatal	8420	6650	44	370	300
Serious	1100	300	41	45	10
Slight	540	—	222	120	—
Non-injury	210	—	1114	245	—
TOTAL ..			1421	780	310
				1090	

Table 25

Estimated overall economic effect of the 70 m.p.h. limit on motorways in 1966

	(£)
Reduction in cost of accidents:	
Measurable costs	+780 000
Subjective costs	+310 000
Reduction in fuel and other operating costs ..	+620 000
Increase in time costs	−1 550 000
Net gain	+160 000
Net difference in measurable costs	−150 000

Table 26

Estimated effect of the 70 m.p.h. speed limit on the operating costs of cars on rural all-purpose roads in 1966

Class of road	Increase in journey time per car-mile (seconds)	Car-miles (millions)	Increase in car-hours (thousands)	Cost of extra car hours £ (thousands)	Fuel costs saved (net of tax) £ (thousands)	Other operating costs saved £ (thousands)	Net increase in cost £ (thousands)
Dual-carriageway	1·63	2340	1060	990	255	85	650
Three-lane	0·75	5340	1110	1040	135	45	860
Two-lane	*	31 320					
Total		39 000		2030	390	130	1510

* Not known—assumed to be of no importance.

Table 27

Motorists' opinions on a permanent speed limit of 70 m.p.h. (February 1967)

Question	Reply	All motorists	
		Views on motorways (Percentages)	Views on other fast main roads (Percentages)
Do you feel it would be a good thing to have a permanent speed limit of 70 m.p.h. on (motorways/other fast main roads), or not?	A good thing	61	67
	Not a good thing ..	36	30
	Don't know	3	3
Do you think there should be some permanent maximum speed limit for (motorways/other fast main roads), or not? (Question put to motorists who said 70 m.p.h. limit was not a good thing)	Should be	15	20
	Should not be	20	9
	Don't know	1	1
What ought the maximum speed to be ? (Question put to drivers who said there should be some permanent speed limit—other than 70 m.p.h.)	49 m.p.h. or less ..	*	2
	50–59 m.p.h.	2	11
	60–69 m.p.h.	2	3
	70 m.p.h.	—	—
	71–79 m.p.h.	0	*
	80–89 m.p.h.	4	2
	90 m.p.h. or more ..	6	1
	Don't know	1	1
Total number of motorists		767	767

* Indicates a percentage of less than 0·5.

Table 28

Views on the 70 m.p.h. limit on motorways (Feb. 1967)
Percentages

	All without a current driving licence	All with a current driving licence	All who have driven in the last 12 months	All who have driven in the last 12 months but not more than 6000 miles	All who have driven over 6000 miles in the last 12 months
A trial 70 m.p.h. limit on motorways is a good thing	70	77	77	79	77
A trial 70 m.p.h. limit on motorways is not a good thing	20	21	21	19	21
Don't know	10	2	2	2	2
A permanent 70 m.p.h. limit on motorways would be a good thing ..	60	61	61	67	53
A permanent 70 m.p.h. limit on motorways would not be a good thing ..	29	36	36	30	44
Don't know	11	3	3	3	3
A permanent 70 m.p.h. limit on motorways, or a permanent limit of less than 70 m.p.h., would be a good thing	78	66	66	74	56
Number of respondents	1426	817	767	392	354

Note: The sub-groups do not add up to the full totals in every case, because a few respondents did not answer the questions about what driving they did.

Table 28 (*Continued*)

Views on the 70 m.p.h. limit on motorways (Feb. 1967)
Percentages

	All who have driven in the last 12 months but who drove on motorways less than once a month or not at all	All who drove on motorways once a month or more often	All who drove in the last 12 months, but who never drive a vehicle capable of going at over 70 m.p.h.	All who have driven in the last 12 months and who have driven a vehicle capable of going at over 70 m.p.h.	All respondents interviewed
A trial 70 m.p.h. limit on motorways is a good thing	79	74	79	77	73
A trial 70 m.p.h. limit on motorways is not a good thing	19	26	18	22	20
Don't know	2	0	3	1	7
A permanent 70 m.p.h. limit on motorways would be a good thing ..	65	49	66	59	60
A permanent 70 m.p.h. limit on motorways would not be a good thing ..	32	49	30	39	32
Don't know	3	2	4	2	8
A permanent 70 m.p.h. limit on motorways, or a permanent limit of less than 70 m.p.h., would be a good thing	70	51	75	62	73
Number of respondents	577	177	216	538	2243

Note: The sub-groups do not add up to the full totals in every case, because a few respondents did not answer the questions about what driving they did.

Table 29

Views on the 70 m.p.h. limit on fast main roads (Feb. 1967)
Percentages

	All without a current driving licence	All with a current driving licence	All who have driven in the last 12 months	All who have driven in the last 12 months but not more than 6000 miles	All who have driven over 6000 miles in the last 12 months
A trial 70 m.p.h. limit on fast main roads is a good thing	62	77	77	78	76
A trial 70 m.p.h. limit on fast main roads is not a good thing	28	21	21	20	21
Don't know	10	2	2	2	3
A permanent 70 m.p.h. limit on fast main roads would be a good thing	53	67	67	68	67
A permanent 70 m.p.h. limit on fast main roads would not be a good thing	37	30	30	30	31
Don't know	10	3	3	2	2
A permanent 70 m.p.h. limit on fast main roads, or a permanent limit of less than 70 m.p.h., would be a good thing	84	83	84	88	80
Number of respondents	1426	817	767	392	354

Note: The sub-groups do not all add up to the full totals in every case, because a few respondents did not answer the questions about what driving they did.

Table 29 (*Continued*)

Views on the 70 m.p.h. limit on fast main roads (Feb. 1967)
Percentages

	All who have driven in the last 12 months but who drove on fast roads less than once a month or not at all	All who drove on fast main roads once a month or more often	All who drove in the last 12 months, hut who never drive a vehicle capable of going at over 70 m.p.h.	All who have driven in the last 12 months and who have driven a vehicle capable of going at over 70 m.p.h.	All respondents interviewed
A trial 70 m.p.h. limit on fast main roads is a good thing	74	78	77	78	68
A trial 70 m.p.h. limit on fast main roads is not a good thing	24	20	21	20	25
Don't know	2	2	2	2	7
A permanent 70 m.p.h. limit on fast main roads would be a good thing	67	68	68	68	58
A permanent 70 m.p.h. limit on fast main roads would not be a good thing	30	30	29	31	34
Don't know	3	2	3	1	8
A permanent 70 m.p.h. limit on fast main roads, or a permanent limit of less than 70 m.p.h., would be a good thing	86	84	87	83	84
Number of respondents	197	560	216	538	2243

Note: The sub-groups do not all add up to the full totals in every case, because a few respondents did not answer the questions about what driving they did.

Table 30

Changes with time in public opinion (N.O.P. surveys)
Percentages

Date of survey	Question	Reply	Electors in England and Wales	Electors who are motorists in England and Wales
December 1965	Do you approve or disapprove of the 70 m.p.h. speed limit on all roads?	Approve	53	60
		Disapprove.. ..	41	38
		Don't know ..	6	2
February 1966	Do you approve or disapprove of the 70 m.p.h. speed limit on motorways?	Approve	54	53
		Disapprove.. ..	34	43
		Don't know ..	12	4
	Do you approve or disapprove of the 70 m.p.h. speed limit on roads other than motorways?	Approve	55	68
		Disapprove.. ..	36	30
		Don't know ..	9	2
February 1967	There is a trial 70 m.p.h. speed limit at present on motorways. Do you think it is a good thing to have a *trial* speed limit of 70 m.p.h., or not?	Yes	73	79
		No	20	20
		Don't know ..	7	1
	Do you feel it would be a good thing to have a *permanent* speed limit of 70 m.p.h. on motorways, or not?	Yes	61	62
		No	31	36
		Don't know ..	8	72
	There is a trial 70 m.p.h. speed limit at present on all fast main roads. Do you think it is a good thing to have a *trial* speed limit of 70 m.p.h., or not?	Yes	65	78
		No	27	21
		Don't know ..	8	1
	Do you feel it would be a good thing to have a *permanent* speed limit of 70 m.p.h. on all fast roads, or not?	Yes	58	69
		No	34	29
		Don't know ..	8	2

Notes: 1. Over 2000 electors were interviewed in each survey and 400 motorists, using the 'primary petrol buyer' definition and applying this to electors.
2. The first survey was carried out before the limit came into force.

Table 31

Changes with time in motorists' opinions on the trial 70 m.p.h. limit
Percentages

Date of survey	Question	Reply	Motorists in England and Wales who sometimes drive a vehicle which can go over 70 m.p.h. and who drive on a motorway and/or other fast main roads	All motorists in England and Wales
December 1965 ..	On the whole, do you think it is a good thing to have this 70 m.p.h. limit, or not? (RRL postal survey)	Limit is a good thing ..	74	78
		Limit is not a good thing ..	24	20
		Don't know	2	2
February 1966 ..	On the whole, do you think it is a good thing to have this trial 70 m.p.h. limit, or not? (RRL postal survey)	Limit is a good thing ..	84	84
		Limit is not a good thing ..	15	15
		Don't know	1	1
February 1967 ..	There is a trial 70 m.p.h. speed limit at present on motorways. Do you think it is a good thing to have a *trial* speed limit of 70 m.p.h.. or not? (NOP survey)	Yes	78	79
		No	21	19
		Don't Know	1	2
	There is a trial 70 m.p.h. limit on all fast main roads. Do you think is is a good thing to have a *trial* speed limit of 70 m.p.h., or not? (NOP survey)	Yes	77	76
		No	22	22
		Don't know	1	2

Notes: 1. The term 'motorist' is used in this table to indicate electors with a current driving licence who have driven in the last 12 months (1967) or who say 'yes' when asked 'Do you drive?' (1965 & 1966).

2. Some 300 motorists were involved in the two R.R.L. surveys, of whom some 200 were personally affected by the speed limit (Column 1). The corresponding numbers from the N.O.P. survey are 578 and 422.

Table 32

Ways in which the 70 m.p.h. speed limit has made things more difficult for car drivers on motorways (188 motorists)

	Motorists who specify a particular difficulty, as a percentage of 188 motorists who think the 70 m.p.h. limit has made things more difficult
The 70 m.p.h. limit leads to queuing, or to bunching	33
Not sufficient margin of speed for overtaking	14
Takes longer to reach destination	8
Motorists drive faster, or nearer to the permitted maximum ..	4
Motorways are constructed for high speeds/for speeds higher than 70 m.p.h.	4
Fast cars are held up, but such cars are able to go fast safely ..	4
Other disadvantages of fast cars being held up	20
Limitation of speed causes impatience, or frustration, or reckless driving	9
Other disadvantages of 70 m.p.h. limit	13
Advantages cited. Irrelevant replies. Don't know	15

Note: Percentages add up to more than 100 since some drivers cited more than one difficulty.

Table 33

Ways in which the 70 m.p.h. limit has made things more difficult for car drivers on other fast main roads (91 motorists)

	Motorists who specify a particular difficulty, as a percentage of 91 motorists who think the 70 m.p.h. limit has made things more difficult
The 70 m.p.h. limit leads to queuing, or to bunching	23
Motorists drive faster, or nearer to the permitted maximum ..	10
Limitation of speed causes impatience, or frustration, or reckless driving	8
Takes longer to reach destination	4
Fast main roads are meant for high speed	3
Fast cars are held up but such cars can go fast safely	2
Other disadvantages of fast cars being held up	14
Other disadvantages of 70 m.p.h. limit	17
Advantages cited. Irrelevant replies. Don't know	25

Note: Percentages add up to more than 100 since some drivers cited more than one difficulty.

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